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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/067,520	02/05/2002	Krishnan Shrinivasan	NOVLP029/NVLS-000495	7203
22434	7590	03/25/2004	EXAMINER	
BEYER WEAVER & THOMAS LLP P.O. BOX 778 BERKELEY, CA 94704-0778			KORNAKOV, MICHAIL	
			ART UNIT	PAPER NUMBER
			1746	

DATE MAILED: 03/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/067,520

Applicant(s)

SHRINIVASAN ET AL.

Examiner

Michael Komakov

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-111 is/are pending in the application.
- 4a) Of the above claim(s), 29,31,34,37-40, 60-111 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5,9-11,14-16,18-28,32,33,41-52,54 and 58 is/are rejected.
- 7) ☒ Claim(s) 6-8,12,13,17,35,36,53,55-57 and 59 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 4/11/02; 7/14/03; 8/13/02; 6/12/02
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. Claims 60-111 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 12/29/2003.

Applicant elected species of a spring-energized U-cup seal, therefore, claims 29, 31, 34, 37-40 (since the holes, not grooves are elected) are not readable on the elected species and are withdrawn from consideration.

### *Double Patenting*

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claim 1 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/458048. Although the conflicting claims are not identical, they are not patentably distinct from each other because each one of independent claims 1 in the instant Application and in US'048 call for identical structural units of apparatus, except

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for the US'048, which utilizes support for plurality of semiconductor wafers, while the instant Application call for the support for the wafer. However, although the reference did not disclose a support for plurality of wafers, it is noted that the court held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced, *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960)

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Claim Objections***

2. Claims 19-21, 46 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The claims 19-21 do not recite ANY structural elements of the claimed apparatus, but rather the method steps in the apparatus claims..

3. Claim 10 is objected to because of the following informalities: The misspelled word circulation should be corrected. Appropriate correction is required.

4. The use of the trademarks in claim 33 has been noted. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Claim 11 recites the limitation "the pump" in line 2. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by DeYoung et al (U.S.2002/0112746).

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DeYoung discloses a system for cleaning semiconductor wafers (abstract), the system comprises a solvent delivery mechanism (Position 22 on Fig.2 and [0040], a process vessel in a downstream communication with solvent delivery mechanism (position 21 on Fig.2 and line 3 of [0039]) and a recirculation system in the fluid communication with process vessel ([0043], lines 6-10 and position 26 on Fig.2. The Supercritical carbon dioxide recirculates through the process vessel to contact with the surface of the wafer to be cleaned, and thus cleans the surface of the wafer. Thus all the structural elements of the instant claim 1 are disclosed in DeYoung.

10. Claims 1-4, 15, 16, 19-22, 44, 46-50 are rejected under 35 U.S.C. 102(a) as being anticipated by WO 01/33613.

WO'613 discloses a system for cleaning a semiconductor wafer, the system comprises a solvent delivery mechanism (positions 224, 326 and 238 on Fig.7) (this reads on a solvent delivery mechanism and a supercritical solution generator of the instant claims 1 and 2) , a processing vessel that has a support for wafer (position 226 on Fig.7 and lines 38, 39 on page 8) and recirculation system including pump 230 on Fig.7. See also lines 33-37 of page 8. The outlet to deliver the supercritical solution to the process vessel is inherently present since the solution is delivered to the process vessel. With regard to claims 3, 49-51 see positions 228, 244, 248 and 249 of Fig.7. With regard to claim 4, WO'613 discloses an a pump 224 configured to pressurize cleaning liquid and a heat exchanger 238 in fluid communication with the pump, configured to heat the solution to a temperature higher than its critical temperature.

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(page 8, lines 20-23). With regard to claim 22, the top and the bottom surface of a process vessel make-up the first and second plate.

With regard to claim 15 see page 9 first paragraph, wherein the depressurizing system capable of removing the supercritical solution from the process vessel is described.

With regard to claim 44, WO'613 describes an embodiment wherein the wafer is spun (page 8, lines 40, 41), thus inherently teaching the mechanism by which such spun is provided. With regard to claim 46, it is noted that the claim does not recite any further structural elements compare to claim 1, but the environment in which the apparatus operates. It is well settled that the manner of operating does not differentiate apparatus claim from the prior art if the prior art apparatus teaches all of the structural limitations of the claims, consult *Ex parte* Marsham, 2 USPQ 2-nd 1647 (BPAI 1987). The heater of claim 47 is described by position 240 on Fig.7 of WO'613. With regard to claim 48, since the additional heater is not specified, it is believed that heater 240 is fully capable of performing the functions of the heater of the instant claim 48.

### ***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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12. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 5, 14, 11, 25, 42, 43, 45, 52, 54, 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO'613.

WO'613 is silent about the pressure sensor and/or pressure controller intended to control the pressure in the process vessel. However, WO'613 clearly motivates to utilize such controllers by emphasizing the importance of maintaining precise critical pressure of carbon dioxide of 1.070 psi. Therefore, it would have been obvious to those skilled in the art to introduce the pressure sensor and/or pressure controller in the pressure



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maintaining system of WO'613 in order to maintain critical pressure as discussed above.

With regard to claim 14, the presence of isolation valve in WO'613 is obvious to those skilled in the art, since the recirculation process should be stopped at some point to drain the contents into collection vessel 234.

With regard to claim 52, the syringe pumps are notoriously used in the art of pumping fluids, therefore, it will be obvious to one skilled in the art to include the syringe pump in the system of WO'613 with the reasonable expectation of success.

15. Claims 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over DeYoung. DeYoung does not specifically indicate an inline static mixer to provide circulation path of a supercritical liquid. However, DeYoung discloses a stirring device or other means of agitation ([0039, lines 8, 9]), thus motivating those skilled in the art to utilize any types of conventional mixers with the reasonable expectation of success.

16. Claims 18-21, 26, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO'613 in view of DeYoung. Wo'613 does not specify the use of a recycling system for solvent as per claim 18. DeYoung teaches that the solvent can be distilled to allow carbon dioxide to be recycled and reused ([0043, lines 1-12]). It would have been obvious to those skilled in the art to include the recycling system of DeYoung in the system of WO'613 in order to reduce consumption of supercritical fluid and thus provide an economical advantage. With regard to claims 19-21 it is noted that the

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above claims do not recite any structural elements of apparatus compare to the patent claims, and It is well settled that the apparatus claims must be structurally distinguishable from the prior art in terms of structure, not function, consult *In re Danley*, 120 USPQ 528, 531 (CCPA 1959).

With regard to claims 26-28, WO'613 does not teach the presence of the door and a seal on that door.

DeYoung teaches that the processing vessel may include the door [0039, line 7], and in order to maintain a pressure within the given range and avoid the leaks the seal should be used. Those skilled in the art would have found obvious to utilize the door with the seal as suggested by DeYoung in the system of WO'613 in order to maintain the processing conditions in the cavity of WO'613 with the reasonable expectation of success. It is noted that in claim 28 the primary and the secondary seals are identical. Although the reference did not disclose a plurality of seals, however, since the primary and the secondary seals are identical, the duplication of parts has no patentable significance unless a new and unexpected result is produced, *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960) .

17. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO'613 in view of DeSimone (U.S. 6,211,422) . WO'613 does not specifically teach the stainless steel material of the process vessel. The use of stainless steel is conventional in supercritical processing of semiconductor wafers, which is proved, for instance, by DeSimone The reacting step is typically carried out in a reaction vessel, (e.g. stainless steel pressure vessel), at any suitable temperature and pressure that

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maintains the carbon dioxide as a liquid or a supercritical fluid and provides the desired properties for the reaction (see col. 3, lines 43-45). Therefore, one skilled in the art would have found obvious to use conventionally employed stainless steel pressure vessels in a process of WO'613 in order to avoid corrosion and thus to arrive at the instant claims 23 and 24.

18. Claims 30, 32, 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO'613 in view of Wiese (U.S. 3,858,890).

The use of spring-energized U-cup seals in apparatuses to reinforce the sealing ability is known in the art, such as provided in Wiese. Therefore, those skilled in the art would have found obvious to utilize spring-energized U-cup seals of Wiese in order to reinforce the sealing ability of a process vessel of WO'613 and to maintain the defined pressure.

***Allowable Subject Matter***


19. Claims 6, 7, 8, 12, 13, 17, 35, 36, 53, 55, 56, 57, 59 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The structural limitations of the above claims are not taught or suggested by the prior art references alone or in combination in conjunction with the claimed system

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (571) 272-1302. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michael Kornakov  
Examiner  
Art Unit 1746

March 18, 2004